NOVEMBER/DECEMBER 2023

GCH12/DCH12 — INORGANIC CHEMISTRY-I

Time : Three hours

Maximum : 75 marks

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SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Mention the use of molecular sieves.

2. Give a method of preparation of Phosphonitrilic chloride.

3. Give an example for Hydroboration.

4. Write a brief note on Diborane.

5. State HSAB concept of Acids and Bases.

6. Differentiate between thermodynamics stability and kinetic stability of metal complexes.

7. Define Chirality.

8. List any two types of crown ethers.

9. Predict the d–d absorption spectrum of $NiCl_4^{2-}$.

10. $[Fe(H_2O)_6]^{3+}$ and $[Cr(H_2O)_6]^{3+}$ are equally stable thermodynamically but the former is labile where as the latter is inert. Why?

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Explain the nature of bonding of Isopolyacids.

Or

(b) Distinguish between ortho and pyro silicates.

12. (a) Give an example for Amphibole silicates. Give its structure.

Or

(b) Describe the structure of Cubane clusters.

13. (a) Discuss about the factors affecting the stability of metal complexes.

Or

(b) Differentiate between step wise and over-all stability constants of a complex formation reactions.

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14. (a) Write short notes on ORD.

Or

(b) Give the structure and bonding nature of Corrins.

15. (a) What is spectrochemical series? Why is it so called?

Or

(b) CN^- and NO_2^- complexes have high Δ values. Explain.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss the preparation, properties and structure of S_4N_4.

17. Elaborate the different types of Metal Atom clusters.

18. Discuss the different methods of determining stability constants of complexes.

19. Sketch the possible geometric isomers for $[Cr(NH_3)_2Cl^4]^-$ which of these isomers will exhibit optical isomerism.

20. State and explain the Jahn-Teller distortion. What are its consequences.
